What is claimed is:

1. A bone anchor for use in the stabilization of motion segments of the spine, comprising:

an engagement portion configured for engagement within a spinal motion segment;

a head portion configured for engagement to a stabilization element outside the vertebral body; and

a flexible portion between said engagement portion and said head portion.

2. The bone anchor according to claim 1, wherein said engagement portion includes an elongated shank having bone engaging threads.

3. The bone anchor according to claim 2, wherein:

said elongated shank is sized for engagement within the pedicle of a vertebra; and

said flexible portion is arranged to reside substantially extra-pedicular when said bone anchor is engaged within the pedicle of a vertebra.

4. The bone anchor according to claim 1, wherein said head portion includes a threaded stem configured for threaded engagement with a nut.

5. The bone anchor according to claim 1, wherein said flexible portion includes an elongated body spanning between said engagement portion and said head portion, said elongated body defining at least one hinge element.

6. The bone anchor according to claim 5, wherein said at least one hinge element includes a slot defined in said elongated body having an axis substantially transverse to the longitudinal axis of said body.

7. The bone anchor according to claim 6, wherein said slot terminates within said elongated body with a bore substantially perpendicular to said axis of said slot.

8. The bone anchor according to claim 5, wherein said flexible portion includes at least two hinge elements arranged to permit flexing of said bone screw in a common plane.

9. The bone anchor according to claim 8, wherein said at least two hinge elements each include a slot defined in said elongated body having an axis substantially transverse to the longitudinal axis of said body.

10. The bone anchor according to claim 9, wherein said at least two hinge elements includes opposing pairs of hinges.

11. The bone anchor according to claim 1, wherein said flexible portion includes a helical spring disposed between said engagement portion and said head portion.

12. The bone anchor according to claim 1, wherein said flexible portion includes an elongated flexible element disposed between said engagement portion and said head portion.

13. The bone anchor according to claim 12, wherein said flexible element is a flexible sleeve.

14. The bone anchor according to claim 13, wherein said engagement portion includes an elongated shank, said elongated shank and said flexible sleeve have substantially equal outer diameters.

15. The bone anchor according to claim 13, wherein said elongated shank and said flexible sleeve are configured for interlocking engagement.

16. The bone anchor according to claim 12, further comprising a tension element anchored at one end to said engagement portion and at an opposite end to said head portion and extending through said flexible sleeve to clamp said sleeve between said head portion and said engagement portion.

17. The bone anchor according to claim 16, wherein said tension element is a cable.

18. The bone anchor according to claim 17, wherein:

said engagement portion includes an elongated shank that defines a longitudinal bore, opening at a proximal and an opposite distal end of said shank;

said flexible element defines a bore therethrough aligned with said longitudinal bore;

said head portion defines a bore therethrough aligned with said longitudinal bore; and

said cable is anchored to said shank at said distal end and extends through said longitudinal bore and said bores in said flexible element and said head portion.

19. The bone anchor according to claim 18, wherein said cable includes an enlarged head relative to the diameter of said longitudinal bore at said distal end of said shank.

20. The bone anchor according to claim 1, wherein:

said engagement portion includes an elongated shank;

at least said shank and said flexible portion are integral; and

said flexible portion defines a cross-sectional area along the longitudinal axis of said shank that is substantially less than the cross-sectional area of said shank along the longitudinal axis.

21. The bone anchor according to claim 20, wherein said head portion is integral with said flexible portion.

22. The bone anchor according to claim 21, wherein said head portion defines a cross sectional area along the longitudinal axis of the shank and adjacent said flexible portion that is greater than the cross sectional area of said flexible portion.

23. The bone anchor according to claim 20, further comprising means surrounding said flexible portion for preventing bone overgrowth at said flexible portion.

24. The bone anchor according to claim 23, wherein said means surrounding said flexible portion includes a sleeve configured to conform to said flexible portion.

25. The bone anchor according to claim 1, wherein said flexible portion has a first dimension in a first plane passing through said bone anchor that is less than a dimension of said engagement portion in said first plane.

26. The bone anchor according to claim 25, wherein said flexible portion has a second dimension in a second plane substantially transverse to said first plane that is greater than said first dimension.

27. The bone anchor according to claim 26, wherein said second dimension of said flexible portion is greater than a dimension of said engagement portion in said second plane.

28. The bone anchor according to claim 1, wherein said flexible portion includes an elongated body spanning between said engagement portion and said head portion, said elongated body defining an elongated slot therethrough, said slot extending generally parallel to the longitudinal axis of said elongated body.

29. The bone anchor according to claim 28, wherein said elongated slot originates in said head portion and extends toward said engagement portion.

30. The bone anchor according to claim 28, wherein said head portion defines a channel for receiving an elongated spinal rod therethrough, said channel extending transverse to said elongated slot.

31. The bone anchor according to claim 30, wherein said head portion includes a clamping member configured to engage said head portion to clamp the spinal rod within said channel.

32. A dynamic spinal stabilization system comprising:

a stabilization element configured to span a length of the spine adjacent the vertebrae; and

at least two bone anchors including one bone anchor in accordance with claim 1 and at least one other anchor selected from the group including;

a bone anchor in accordance with claim 1;

a spinal hook having a hook portion configured to engage a portion of a vertebra and a head portion configured to engage the stabilization element; and

a substantially rigid bone screw having a threaded portion configured to engage a portion of a vertebra and a head portion configured to engage the stabilization element.

33. The dynamic stabilization system according to claim 32, wherein said stabilization element is an elongated plate defining at least two openings therethrough for receiving a corresponding one of said at least two bone anchors.

34. The dynamic stabilization system according to claim 33, wherein:

said head portion of said at least two bone anchors includes a substantially spherical surface; and

said elongated plate defines a substantially spherical recess at each of said at least two openings.

35. A dynamic stabilization apparatus for stabilization of motion segments of the spine comprising:

a stabilization element configured to span a length of the spine between at least two motion segments; and

at least two anchors, each of said anchors including a head portion configured for contacting said stabilization element and an engagement portion configured for engaging a motion segment, and at least one of said anchors including a flexible portion between said head portion and said engagement portion configured to permit relative movement between said head portion and said engagement portion.

36. A method for dynamic stabilization of motion segments of the spine comprising the steps of:

positioning a stabilization element adjacent the spine, the stabilization element configured to span a length of the spine between at least two motion segments;

engaging bone anchors to at least two motion segments; and

coupling the bone anchors to the stabilization element, with at least one of the bone anchor coupled to permit deflection of the bone anchor between the stabilization element and the motion segment.

37. The method for dynamic stabilization according to claim 36, further comprising the step of repairing or replacing all or part of the intervertebral disc between at least two motion segments.

38. The method for dynamic stabilization according to claim 37, wherein the step of repairing or replacing includes replacing all or part of the nucleus pulposus with a polymeric prosthesis having physical properties substantially similar to the physical properties of a natural nucleus pulposus.

38. A method for dynamic stabilization of motion segments of the spine comprising the steps of:

positioning a stabilization element adjacent the spine, the stabilization element configured to span a length of the spine between at least two motion segments;

engaging bone engaging anchors to at least two motion segments; and

coupling the bone engaging anchors to the stabilization element, with at least one of the bone engaging anchors configured to produce a center of rotation for the motion segment between the stabilization element and the normal anatomic center of rotation for the motion segment.

39. In a method for correction of scoliosis in which a contoured rod is engaged to at least a portion of the deformed spine and is rotated to de-rotate the spine in the transverse plane, the improvement of engaging at least one vertebrae at either or both the superior and inferior ends of the rod to the rod to provide a center of rotation for the at least one vertebra that is between the rod and the normal anatomic center of rotation for the vertebra.

40. In a method for correction of spondylolisthesis in which a slipped vertebra is pulled posteriorly to a stabilization element engaged to spinal elements adjacent the slipped vertebra, the improvement comprising engaging a bone anchor to the slipped vertebra that is configured to be pulled toward the

stabilization element and that is configured to provide a center of rotation for the slipped vertebra that is between the stabilization element and the normal anatomic center of rotation for the vertebra.

41. A method for dynamic stabilization of a motion segment of the spine comprising the steps of:

introducing a device into an intervertebral space to at least partially maintain or restore the natural motion of the disc at the motion segment; and

coupling a dynamic stabilization system across the motion segment, the system including at least one bone anchor that permits natural motion of the disc by deforming a portion of the bone anchor.

42. The method for dynamic stabilization according to claim 41, wherein the device includes a device for replacing or augmenting the nucleus pulposus of the intervertebral disc.

43. The method for dynamic stabilization according to claim 42, wherein the step of introducing a device includes introducing a polymeric prosthesis to replace or augment the nucleus pulposus in which the polymeric prosthesis exhibits physical properties similar to the natural nucleus pulposus